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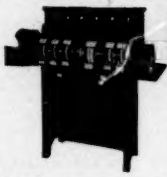
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The Official Journal of the Rocks and Minerals Association

VOL. 11, No. 7

WHOLE No. 61

Chester, Vermont, Land of Pyrite Cubes

By R. EMMET DOHERTY

President Rocks and Minerals Association

On Sunday, April 26, 1936, at 7 o'clock in the morning, the writer and his good "frau" left Hudson, N. Y., in the company of that well known engineer, chemist, mineralogist and philosopher, Carl H. Klein. Also in the party was a new recruit, Andrew J. Dargis, tool designer and development engineer, who recently became interested in minerals and possesses a vast amount of efficacy which should carry him far in this new field. Mrs. Klein and Mrs. Dargis accompanied their respective husbands.

This bold party of six started out in two cars to forget the troubles of the human element and pry into those of Mother Nature.

The route took in the cities of Chatham, N. Y., Pittsfield, Mass., and North Adams, Mass., where we entered the Mohawk Trail. A few miles up the trail, the sight of Old Greylock Mountain on the right greeted us, raising its head 3,505 feet above the blue lakes on the plains below. The next city was Greenfield, Mass., to Brattleboro, Vt., to Bellows Falls, thence to Chester.

One of the most worthwhile events of the trip was to see the evidences of the flood of the Connecticut River of a few months ago which still can be seen for many months to come.

Between Greenfield, Mass., and Bellows Falls, Vt., mile after mile of white sand has been deposited across fertile fields, from a depth of a few inches to three and one half feet and for a distance of five hundred feet back from the river, ruining cultivation for years to come. Houses with the entire front missing, barns on their sides in the fields miles from their foundations, driftwood and debris littering the landscape, were mute evidences of the havoc created. Hundreds of trees of mighty proportions still held their positions along the river bank but all the bark removed for a distance of twenty five feet up the trunk, caused by the rushing water and ice. Some flats alongside the river were still covered with jams of ice twelve feet high.

The loss to farmers and homesteaders is inestimable and would well make one ask: "What manner of men are these, that built their homes in the path of destruction?"

Before we reached Bellows Falls a fair wind had sprung up and great rolling clouds of white sand were hurrying across the sky blotting out the landscape for great distances up the river.

As we entered the village of Chester, on the main road from Bellows Falls, we crossed a concrete bridge over a small river. This bridge is about forty feet long and eight feet above the water. We drove straight through Chester from this bridge for 2.4 miles to the mine road entrance. The mine is only .4 miles from the entrance and is clearly visible on the right from the main highway.

The Chester Talc Mine is operated by the Vermont Mining Company, most of the talc being used for roofing paper. Production runs about a hundred tons a day. The pit is irregular in shape, its largest dimensions being about 75 by 125 feet. The pump was in operation preparatory to opening the workings for the summer as the water half filled the pit for 45 feet.

The material is hoisted out of the workings by a bucket and cable which is lowered from a steel mast and boom on the surface, after which it is hand picked and the residue is deposited on the waste pile by motor truck. The dump or tailings pile is the chief center of interest and was our goal.

As we approched this chaos of mighty masses of rock torn from the bowels of the earth, loud rappings and the clank of metal was heard and who should spring out to greet us? None other than Mr. Henry G. Savage, competent mineralogist, geologist, collector and general man of letters, accompanied by three young men, namely Lester Heustis, Gilbert Whitney, and Adrien Mercier all of Leominster, Mass.

With a cry, "We have met the Pyrite cubes and they are ours," they spread out a display of Pyrite and Magnetite crystals in Prochlorite that would turn the head of a museum curator. Which proved these collectors to be master chiselers, (the instrument kind).

The sight of this fine material set our hammer arms aquiver and in a short time we were all knee deep in broken rock.

Among some of the finds of the day were the following: Magnificent Pyrite cubes, Magnetite octahedrons, transparent green Talc, flawless smoky Quartz (good gem material) and radiated Actinolite. Not a long list, but first class material.

The only objection to the waste pile is the slippery footing due to the soft talc bearing rock, but a Swiss mountain climber's rope, hob-nail shoes and a yoedeler's hat could easily offset this.

As the day was nearly spent we loaded our respective cars with passengers and specimens and following the guidance of Mr. Savage visited a garnet schist locality at Gassetts, Vt. Good garnet crystals were not in evidence, although many poor ones were easily picked up.

Between Chester and Gassetts were noticed many ancient houses built of stone blocks which had all appearances of dating back to the Revolutionary War.

For scenic interest, good roads and burnished golden cubes, this trail along the Connecticut River must be successful to the collector's paradise; "Chester, Land of Pyrite Cubes."

A Floating Rock Dump

By RICHMOND E. MYERS

The rocks from the mid-town tunnel diggings on Manhattan Island, New York City, are being brought to Long Beach on the south shore of Long Island to be used in the construction of jetties along the ocean front. These rocks are being transported in barges that tie up at the foot of Magnolia Boul., from whence the rock is transported by truck across the island to the beach. The superintendant in charge of these operations is not adverse to mineral collectors climbing over the barges after working hours which end at 4:30 P. M.

So far I have found some excellent smoky quartz, nice garnet xls, two tourmaline xls about one inch high and well formed, fluorite slightly fluorescent and quite large sheets of muscovite. Although this is by no means an imposing list, there is no telling what might turn up some day, and the barges are well worth while watching.

The rocks are very large, so it is best to come prepared for hard work, unless you prefer to go over the small broken pieces after a barge has been unloaded. However, choice crystals may be broken, and it is worth a little elbow grease to go over the barges before the unloading begins.

Thunder Eggs

By E. A. SOUTHWICK

"Thunder Eggs" is a name said to have been given by the Warm Springs, Oregon, Indians to the agate-opal-claystone nodules which are found at a few localities in central Oregon, and which have become justly popular with collectors recently because of their interesting characteristics. They are sometimes called by other names, such as nodulites, amygdules, spherulites, septuary nodules, etc. They are also said to occur at a few places in California, Nevada and Idaho.

These Thunder Eggs vary greatly in character. Most of the deposits are uninteresting and worthless, but occasionally they occur of the finest quality. In size they run from a little over an inch to an occasional one of a foot or more in diameter, the smaller ones usually being "duds," without any agate or opal filling. There is an exception to this in the writer's recent discovery of a deposit of miniature Thunder Eggs, running in size from about the size of a pea to as large as a walnut, averaging somewhere around one inch in diameter, and filled with agate and common opal, exactly like the larger ones.

These nodules are usually round or oval in shape, but there are a few of the "pancake" variety, the latter usually being of poor quality. On the outside they are unattractive, being covered with the claystone matrix, which is quite hard and takes a good polish, and there is little to indicate what the interior may be.

When they are broken or sawed into halves, the core is found to be filled with agate, common opal, or a combination of the two, and frequently is very beautiful. No two of them are exactly alike. Some will be filled with agate or opal of only one color, or colorless, many are banded agate, or alternate bands of agate and opal. Occasionally we are rewarded with one that contains the most beautiful moss agate, or is otherwise highly colored.

They should not be broken with a hammer, as this almost always shatters them, so that much of their attractiveness is lost. It is better to saw them with diamond or mud saw, either into halves or slabs.

The writer has seen one specimen of these Thunder Eggs which had an interior of amethyst, though not of a dark purple, and a few have been reported with fire opal on the inside, but these must be quite rare and are not to be expected ordinarily. However, it is impossible to tell what wonders are going to be revealed when the nodule has been sawed, and it is this very uncertainty that gives unusual interest in making a collection of them.

A few of these nodules are found with hollow interiors, and even a few with quartz crystals inside, but as a rule the filling is of solid agate or opal, the agate predominating in most localities.

The Thunder Eggs are found in "beds," or deposits, where they have weathered out of the surrounding lavas. They are frequently found lying on the surface, or covered lightly with the eroded material. Sometimes they are found embedded in the original lava.

In the case of the deposit of miniature Thunder Eggs discovered by the writer, they are found in both stages—some lying loose on the surface or lightly covered by soil, others being embodied in the outcropping lava, which is one of two types, one being extremely hard, the other comparatively soft.

A Mineral Collector's Outline of Wyoming

By WALTER D. PERRY

I note in the January 1936 issue of ROCKS and MINERALS that to date no article pertaining to Wyoming's minerals has been submitted to its editor for publication—or the waste basket. And asking in the same breath, so to speak, for someone to oblige. However, I was glad to note, Wyoming collectors are not the only dilatory ones.

But truthfully your editor's asking for some one to oblige him by writing an article pertaining to Wyoming's rocks and minerals did not greatly surprise me. Wyoming is a sparsely settled state, hence its number of mineral collectors is probably small. I personally know, however, several Wyomingites much more capable than I, who are well versed upon the subject under discussion, but perhaps, like myself, they fear they haven't the knack of writing interestingly.

Another factor which should be taken into consideration, is the fact that there is a dearth of available mineralogical and geological reports covering the state or even its mineralized belts. Most of the reports which have been published are now out of print. Wyoming, I might add, unlike several of its neighboring states, hasn't advertised her resources to any great extent. Hence the average out-of-state collector, believing there is little or nothing interesting in Wyoming's rolling plains, her sage covered deserts, or hidden away in the fastnesses of her mountain ranges, steps on the gas to get somewhere else, to the places he has heard about, to the places where the crowd goes.

Now it so happens that I've been roaming around old Wyoming nigh on to forty years. (I dislike crowds). My first collections started when as a boy I collected "sand marbles" for "nigger shooter" ammunition. I've been more or less diligent in collecting ever since. I use the term "more or less" advisedly, because I have confined most of my collecting to the years I lived in Wyoming, and, when making my home elsewhere, to those brief prospecting trips into Wyoming mountain fastnesses.

It is my sincere belief that Wyoming has much in store for the hardy collector who isn't afraid to get out and really search; for the collector whose feet itch for dim trails that lead onward toward lofty mountain peak or forbidding desert waste.

But I fully realize that many collectors haven't the time to turn prospector, that their vacation time is short on "both ends," and that hours and even minutes are precious. Yet these collectors, too, will find that Wyoming has many "finds" awaiting their search.

"Thar's gold in them thar hills." One of the finest mineral collections I have ever seen was made by a man who occasionally summered in Jackson's Hole. He had a cabin at the little town of Kelly and one room was devoted to Jackson's Hole minerals, mostly collected in that section of the Hole now incorporated in the Teton National Park. Garnets seemed to be his hobby; Death Canyon his favorite prospecting ground. The collection was swept away in the Gros Ventre flood of a few years ago. A great landslide dammed the river and in the spring two years later this natural dam gave way with dire consequences, but that is another story.

Southwestern Wyoming, especially the Granger-Lyman section, is noted for its fine moss agates. Here too one may find some fine specimens of petrified wood, jasper, and other stones worth sending to the lapidary or for home polishing. This territory is also famed for its Indian relics, and perhaps the Indian's predecessor, for the archaeologists who have worked that region claim to have found relics 200,000 years old! At Fossil and Green River, the fossil hunter finds ideal hunting grounds.

A few years ago a Wyoming State Geologist made the statement that the Green River valley of southwestern Wyoming had more natural resources, from a mineralogical standpoint, than any known area of like size in the world.

To my way of thinking the southeastern portion of the state offers greater opportunities to the collector with limited time than perhaps any other part of the state. Many good county roads, state and Federal-aid highways makes this area most accessible. Then too its mineral resources are many and varied. For instance, at Buford are located the immense Union Pacific gravel pits on a decomposed granite formation and a favorite collecting ground for mining students from the colleges of the west. At Tie Siding, copper minerals are to be found in abundance along a contact. Many unusual and beautiful specimens are to be found there.

Other minerals of the region include sperrylite with copper minerals near Centennial, copper and gold bearing minerals near Encampment. Perhaps 50 miles northwest of Cheyenne is Iron Mountain, one of nature's really great mineralogical masterpieces. East and northeast of Iron Mountain, the Hartville Uplift stretches along the Wyoming side of the Wyoming-Nebraska state line and extends from Guernsey to Lusk. At Sunrise is located the open-pit hematite iron mine, which is the source of the greater portion of the structural iron and steel used in the Rocky Mountain and adjoining states. At the northern end of the uplift at Lusk, in times past, considerable mining activity had taken place. Copper minerals, rare metals, and ruby sand are to be found in that locality.

That part of the Laramie Mountains lying northwest of Laramie peaks and extending to the Natrona county line is a large mineralized belt. In this section are to be found many and varied minerals. Copper prospects are common, chromium is reported from several localities. Stories of "lost mines" and "Spanish diggings" supposedly located in that section, are many, and of course, these "mines" are fabulously rich.

In northeastern Wyoming, especially in the Black Hills sections of Cook and Weston counties, the collector will find much of interest. This section, like the much better known South Dakota side of the Hills, is highly mineralized, and unlike the South Dakota hills, is not overly accessible. The old Welcome district has a lure all its own. I cannot pass this country by without special mention of a great dike of blue phonolite which outcrops in Sand Creek canyon perhaps a mile and a half above "contact." Beautifully naturally polished specimens are found as "float" almost anywhere along the stream above Beulah. There is a road up Sand Creek which a few years ago was open to the mouth of Grand Canyon. Above this point placer gold may be panned in almost any of the old placer prospect pits along the stream.

A collector visiting this section should by all means take time to visit the Bear Lodge, Black Buttes, and Devil's Tower sections.

Unfortunately I have but little acquaintance with the Big Horn Mountain country. Much of the range is inaccessible to the motoring collector although two good highways cross the range. Gold, copper, chromium, and other metals are known to be present.

Nor does my acquaintance extend to the Big Horn Basin country and the mountains east of Yellowstone National Park. However this I do know, minerals which accompany thermal waters are to be found at Thermopolis, sulphur also. Silver and gold have been reported from the mountains east of the Yellowstone National Park.

Now let us consider, somewhat briefly, the central portion of the state. Here is a region of vast prairies and broken mountain ranges. Here one finds the Casper Mountains which contain many and varied minerals, and here also an excellent quality of asbestos has been mined. The nearby Seminoe Mountains contain one of the largest undeveloped bodies of hematite iron ore known in the United States. The gravel beds along the Platte River contain many fine banded and moss agates, cat's eyes, and other stones that take a wonderful polish. Some of the finest petrified wood in the state comes from the upper Powder River country. In the Copper Mountain country north and east of Shoshoni there is one copper outcrop which has been traced over a distance of 14 miles.

The famous old South Pass gold mining district is perhaps the western end of the central mineral belt. This is an area of intense mineralization

and is the state's best known gold producing area. The district seems to be staging a revival. Concerning the minerals of the gold bearing veins, Professor Runner of the University of Iowa says, "In the veins the prominent minerals that -have been recognized are: Calcite, quartz, biotite, muscovite, diopside, actinolite, hornblende, chlorite, tourmaline, apatite, magnetite, arsenopyrite, pyrrhotite, pyrite and free gold."[1] Knight[2] of Wyoming (1901) also mentioned realgar, and orpiment. None of the geologists whose reports I happen to have made more than mere mention of the copper minerals, the outcrops of which are quite common in certain parts of the district. Spencer's[3] report published in 1916 makes special mention of the magnetite schists, and serpentine outcrops north and east of Atlantic city.

There are also many interesting minerals in the various schists and in the intrusive dikes, to say nothing of the extensive pegmatite exposures south and west of South Pass City.

Road building during the past ten years has made much of central Wyoming quite accessible, tho most of the roads into mountainous areas other than the main Federal-aid and state highways are little more than trails.

So I have endeavored, in as brief a manner as possible, to give a glimpse into the possibilities of Wyoming as a field for the collector of rocks and minerals. It is still a comparatively new country, and I believe one that will delight the hearts of both the amateur (such as I am) and the advanced collector.

And now I "sign off" hoping that someone, or several someones, who really know their minerals, will step into the picture with more detailed information concerning the minerals of this great mountain state for the readers of ROCKS and MINERALS.

[1] Bulletin 20, State of Wyoming, Geologist's Office, "*Atlantic City, South Pass Gold Mining District*" by Albert J. Bartlett, State Geologist of Wyoming, with notes on Geology by Professor J. J. Runner, Unv. of Iowa. (1926).

[2] "*The Sweetwater Mining District*" by W. C. Knight. (1901).

[3] "*The Atlantic Gold District and North Laramie Mountains*" papers by Arthur C. Spencer, Bulletin 626, United States Geological Survey. (1916).

Minerals In the Dominican Republic

By DR. WILLY LENGWEILER, *Geologist*

The Dominican Republic is little known, perhaps almost unknown, as a land rich in minerals. But during its early days, soon after its discovery by Columbus, when it was then known as Santo Domingo, large quantities of gold and silver were obtained by the Spaniards. In fact gold mining was so active that the island became famous and every vessel from Mother Spain disembarked new adventurers who were to try their hand at mining.

The first find of gold, a nugget weighing 1200 ounces, was found in the Haina River by an Indian girl. The discovery created intense excitement and there was a rush on the part of the Spaniards to mine for gold. Unfortunately, in their greed for obtaining large amounts and quicky of the precious metal, the native Indian population was distributed among the white men and pressed into service as miners. The gold was panned from the Haina River and other streams and each Indian family had to deliver daily one-half ounce of the yellow metal, otherwise heavy punishment was meted out to them.

In several parts of the island, the Spaniards discovered gold in the rock formations and mines were opened up. The Indians of course were again pressed into service to work them. Some of these mines were heavy producers. One, located near the town of Cotuy, in La Vega Province, produced yearly over one million crown's

worth of gold (about $1,100,000 U. S. currency). This mine was opened up in 1505 and operated until 1520 when it was forced to close down—not because the gold was exhausted, but because at the end of 15 years of operation the last Indian miner died. Since then the mine was never reopened—in fact it became lost and to date has not as yet been rediscovered.

When the gold mines in Santo Domingo closed down because of lack of miners, and as gold and silver were being discovered on the mainland of the American Continent, practically all of the Spanish adventurers emigrated —some going to Mexico, others to Central and South America. After this precipitated desertion of the island by the Spaniards, Santo Domingo has had no more mining activities for centuries.

A Spaniard, Don Antonio de Ullva, Professor of Mathematics, discovered platinum in the gold bearing gravels of the Pinto River, Nueva Granada, now the Republic of Colombia, in South America. A short time later platinum nuggets were also found in the gold bearing rivers in Santo Domingo.

The writer has discovered in the hills and mountains of the island over 30 different minerals which are abundant enough for an industrial exploitation. Furthermore, about 80 per cent of the whole topographic system is gold bearing. In spite of the fact that the Spaniards shipped huge quantities of gold to Spain, today in the Dominican Republic not one mine is in activity. Nevertheless, a large number of the natives, mostly women and children, are busy with their old fashioned wooden pans, panning for gold, with a monthly average production of over $25,000.

In a country so rich in minerals, it is only logical that many of them should occur in crystallized form. Rock crystals especially are common in the profusely distributed siliceous rocks but never in large enough size for a commercial output.

Agates in a number of colors are abundant but never found **in situ.** They especially abound in Seybo, in Barahona, in San Cristobal, and in other parts of the Central Mountain Range.

Near the town of Janico, in Santiago Province, jasper is said to have been found together with opals.

In La Vega Province, in the neighborhood of Cotuy, history relates that lapis lazuli was discovered with incrustations of marcasite.

The Peninsula of Samana consists mainly of a massive solid marble of Cretaceous Age. The marble is a beautiful one in uniform colors of white, blue, gray, green, jet black and combinations of colors and shades. A red micaceous schist is also present containing many fine garnet crystals. The garnets are perfectly formed dodecahedrons of dark wine color, many over 25 mm. in size and sometimes showing fine fissures of a beautiful dark green.

Near the small town of Moncion in Monte Cristi Province, is a deep valley containing a pink colored alluvial fill. In this fill are found gold and platinum nuggets and many small rubies. The rubies, about a millimeter in diameter, would be suitable as bearings in the manufacture of watches.

Noumeaite (silicate of nickel), magnesite, some cobalt, and abundant chromium ore (averaging 55%), are also known.

As the Dominican Republic is a rich and virgin country for minerals, it is therefore a new area for mining ventures. Aside from its commercial aspects, the ore deposits and other localities are really a paradise for the mineral collector. Of course it is quite impossible to give full data on Dominican mineralogy in a short article but it is the writer's intention to describe the minerals in more detail in future articles for ROCKS and MINERALS.

Editor's Note—The Dominican Republic embraces the eastern portion of the island of Haiti (the second largest island in the West Indies). Its area is 19,332 sq. miles and population slightly over 1,000,000. Formerly known as Santo Domingo, its name was changed in 1844 to the Dominican Republic.

Garnets of Salida, Colorado

By ALLAN CAPLAN

Box 144, Boulder, Colorado

The occurrence of the large "Salida garnets" at the Sedalia copper mine is well known; a large and fine representative is often seen in many fine collections.

The Sedalia mine is situated four miles north of the town of Salida in the first foothills rising on the eastern side of the valley. The mine was an active producer around 1907, the ore being copper with some gold and silver. At the present time, the mine is just another non-producer; its jumbled and falling buildings still dominate the tops of the three large ascending dump piles.

The prevailing rocks are schists, with dikes of light-colored pegmatite cut conspicuously through them. The ore body lies conformable with the schists in a lens, approximately 800 feet long and 150 feet thick. The ore is a mixture of limonite, cuprite, malacite, chalcocite, with some sphalerite, galena, and cerussite.

The series of micaceous schists are of sedimentary origin, and in pre-Cambrian times diabase or gabbro was intruded bringing the copper and associated mineralization.

Garnets are found in various series of schists, but they are very small in size. The writer has found the larger garnets appearing in the schist next to the pegmatite dikes. The average size of the garnets in this schist is from one to three inches. Occasionally perfect duodecahedrons four inches in size are found in fine collections. Dana mentions a 14-pound garnet crystal from this locality, and the writer estimates its size to be about six inches across.

For many years, when the property was in operation, fine crystals were taken out from the mine; and collectors and visitors have gathered the loose crystals from near the outcrop. Garnets in large crystals compose about one-fifth of the schist-like rock which is next to the barren pegmatite dikes. However, considerable difficulty arises, at the present time, in securing fine specimens. One must drill holes and blast in order to be able to work in such a manner as to extract the crystals; but in blasting, most of the garnets will be shattered and ruined. Perhaps a few will remain with partially exposed faces, and these must be worked out carefully. Even then a crystal is likly te be ruined, but with persistent effort a large and perfect schist-coated duodecahedron, two or three inches in size, will eventually be obtained.

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Largest Stone Ever Quarried

The largest known block of stone ever quarried, says THE BUILDING TIMES (England), lies in an abandoned quarry near the ruins of the "Temple of the Sun" at Baalbek, Syria.

The block of stone, termed monolith, is 69 ft. long, 17 ft. wide, and 14 ft. thick and its weight is estimated at 1,500 tons.

The temple contains similar blocks though not so large, so it is assumed the large one was also intended for the temple. When, by whom and how the huge blocks were quarried, transported and raised into position may never be known as the work was done in ancient times by a race which left no records.

Talc at Murphy, North Carolina

By FRANKLIN A. THURMAN

The writer had an opportunity recently to visit a talc mine near Murphy, North Carolina, and due to the unusual occurrences of the mineral in this region thinks that it might be of interest to some of the readers of ROCKS and MINERALS.

For the benefit of those who are unfamiliar with talc a brief description is given.

Talc, chemically, is a hydrous magnesium silicate. Due to its physical properties it is one of the easiest minerals to determine. It has hardness of one and a greasy soapy feel somewhat like the feel of jasper. Its color is white, gray, or green, giving a white streak. The structure is massive or fibrous; massive talc being found in the Appalachian region, while the talc produced in the New York section is generally of a fibrous structure. So far as the writer knows, all the talc deposits found are in metamorphic rock although many deposits have been found associated with basic igneous rocks. Talc has a great variety of uses, chief among which may be mentioned the following: Sizing of cloth, making of fireproof paints, heat resisting covering for boilers and steam pipes, and last but not least for the making of milady's face powder.

It is not definitely known how talc is formed. One of the most commonly accepted theories states that it is a metamorphosed product obtained when a dolomite is changed through heat and pressure to a silicate and the silicate in turn changed to a talc. Under this hypothesis the action would be brought about with the help of meteoric waters carrying carbon dioxide in solution. The same process might be brought about by an intrusive mass of igneous material coming into contact with a dolomite while the magma retained enough heat to bring about the change,

The talc mine visited at Murphy, is located on the south side of the Hiwassee River, about one mile downstream from the highway bridge across the river. Due to floods a few days previous, it was not possible to go down into the shaft which was water-filled to within a few feet of the top.

Mr. Robert C. Price, in whose company the writer visited the mine, stated that the shaft was down to an eighty foot level and that all the high grade talc was being taken from that depth.

The peculiar occurrence of talc in this vicinity is the fact that it occurs in lens structures in Cambrian marbles. The Cambrian formation is exposed here due to the folding, uplift, and subsequent erosion, laying bare in the Appalachians beds of highly metamorphosed Cambrian rock. The talc deposit visited was overlain by about sixty feet of fine grained white marble, indicating a probable sedimentary origin of the talc. Unfortunately the marble is so broken and fractured at this locality that it has no commercial use, but at Marble, North Carolina, about six miles distant and probably on the same formation the marble is quarried extensively, and is one of the best marbles in this section of the country.

Several samples were collected of both the talc and the marble. One specimen in particular proved very interesting, evidently having come from the contact zone. The specimen was roughly 18 inches by 12 inches, and 6 inches thick. The top of the specimen was marble and the bottom was talc. From the marble on top it graded gradually into the talc on the bottom. There was no sharply defined bedding plane.

Mr. Price gave the writer a section of a marble core taken from a bed in that vicinity which was a very welcome addition to his small but growing collection.

Due to a lack of time no other localities could be visited, which was rather unfortunate since there are a great many sites of interest to the collector in the vicinity of Murphy.

What Do You Think?

By HOWARD R. WILLIAMS

Western Reserve Academy, Hudson, Ohio

Some of us may remember that deservedly popular lecture by the late Dr. Russell Conwell, "Acres of Diamonds." Dr. Conwell expanded upon the experience of a poor farmer who sold his farm and all he possessed to go in search of diamonds, only to hear, after a long and fruitless experience, that diamonds had been discovered on the old home farm which he had sold.

Again in his monograph "How to Collect Minerals," Mr. Peter Zodac cautions us not to neglect our figurative back yards as something of interest may be found almost anywhere.

Both men are right. Let me tell one of my own experiences to illustrate.

I live in northeastern Ohio, and while interested in minerals, it did not occur to me to prospect my own part of the country seriously because there are exceedingly few minerals (strictly speaking) native to this territory. However, I one day found a "freak." It was a freak to me then and still is. The find was an accident. One of those rare accidents that challenge one to careful thinking. One of those finds which keeps the mind flexible; which keeps it from becoming adamant as the collector's specimens.

I ran across this freak in a deep gorge cut out by a small stream through a sandstone and shale deposit near the town of Bedford in northeastern Ohio. I have submitted it to a dozen men including mineralogists and geologists whom I thought might be able to explain it. They couldn't.

Here is a possible explanation. There are many large sandstone boulders in this gorge which have broken off from the edge of a water fall which is now a half mile further up stream than the location of my freak.

Imbedded in one of these sandstone blocks, weighing a couple of tons, I found a piece of pink feldspar about 1" by 1¼". I chipped it out with a slab of the surrounding sandstone. My specimen is almost an inch in thickness and the feldspar does not show through it, so the piece of feldspar is something less than one inch thick.

The boulder showed no other evidence of including feldspar in its composition, nor did any of the other numerous boulders near it. The following questions arose in my mind, "How did one lone piece of feldspar come to be included in the sandstone?" "If one, why not many?" "How did so large a piece of feldspar get so far out to sea as to be deposited among the fine sands being deposited in that locality?"

The mineralogists and geologists who have seen the specimen, not being able to explain it, I, being neither, decided to explain it myself.

Once upon a time, a tree or other large vegetable growth, which grew many miles away from the spot of the find, grew a root around and included the piece of feldspar. A stream nearby, during a spring freshet, undermined the tree and washed it down stream and finally to the ocean. There, after long wanderings of floating and being beached, the root disintegrated somewhat and upon a final washing into the sea, floated to some distance from shore and there dropped the piece of feldspar among the sands being deposited. Later the sands, including the piece of feldspar, consolidated, still later the wrinkling of the face of mother earth hoised the sandstone up to be dry land. Again later the little stream cut the gorge through the deposit and exposed the feldspar, and yet again later I came along and added it to my collection.

That is my story and I mean to stick to it until some of you mineralogists and geologists tell me a better one.

THE AMATEUR LAPIDARY

Conducted by J. H. HOWARD*
504 Crescent Ave., Greenville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones*, and *Handbook for the Amateur Lapidary*.

Mechanics of Cutting and Polishing

By J. H. HOWARD

Most of us are content with results and give no thought to cause. Often results are not what we wish and being ignorant of causes were are not able to modify our operations to attain the desired results. This was impressed on us very forcibly in the days when we were trying, without adequate instructions, to learn how to cut and polish stone. We would conclude that if we do such and such a thing as the next operation the effect of the operation should be so and so. But quite often the result would be far from that expected.

In the face of many of these failures we come to realize that the cause of our erroneous reasoning was ignorance of what is occurring during an operation.

This started a train of thought that led into maze, but a most interesting maze.

We have tried to get someone who knows whereof he speaks, to write on this subject. One scientist who has edited and partly written an excellent book on a closely related topic replied that the subject was most fascinating and he was tempted to "mix in" but if he should do so it would be a case of "fools rush in—" etc.

The technical staff of a large abrasive company was appealed to and declined to write on the ground that there were many theories on what constitutes polishing and cutting by abrasion, that each theory had its firm adherents, and that too little was actually known of the processes to make it possible to write authoritatively on the subject.

So it seems we amateurs will have to work out our own theories. Most of them may be wrong, but it is a fruitful field to dig in, and if it is worked seriously it will certainly yield some harvest.

What follows in this article is intended merely as a stating of the problems. This magazine is looking to its readers of this department to contribute their reasoning on the subject and to pool their ideas in its pages. May we hear from you?

The amateur gem cutter will find a good many things of interest in "**Amateur Telescope Making**" published by THE SCIENTIFIC AMERICAN. In the chapter of miscellanies in that volume there are dissertations on the theory of cutting and polishing. These notes are specifically on glass cutting and polishing, but are equally applicable to stones of about the same hardness of glass. Also they refer to forming and polishing optical surfaces, but we as gem cutters should strive to attain an equal degree of fineness in polishing, though we do not need to be concerned, as the telescope maker is, with the exact shape of our work.

The telescope maker shapes his mirror by rubbing two glass disks together, keeping wet Carborundum between. Note that in this operation the abrasive grains are not fixed but are free between the two disks. Let Mr. Albert J. Ingalls, Editor of the above mentioned volume, tell what happens—what constitutes the "grinding":

"Without taking particular thought one might assume that the grains of abrasive act simply as plows, like the

tool on a planer or shaper. It is thought, however, that this sort of thing occurs only when a grain drops into a depression in the one glass disk or the other and becomes lodged there. Mainly, the operation of grinding is something like what we would have on a large scale (visible) if we were to place a number of large steel balls on a cake of ice, with a second cake on top of the balls, and move the upper cake over the lower. Behind each ball, as it rolled, there would be a path, not planed or gouged out but fragmented by pressure. On glass we get something of the same thing with a glass cutter, which is not a cutter at all, but a local splinterer. With abrasives, the pressure directly under the particles is transferred downward and outward, and conchoidal chips of glass are pushed and sheared out laterally. And the greater the pressure the greater the depth of shearing involved. Grinding takes place in direct ratio to pressure per unit area."

Note that the above operation is purely a "grinding" one with no polishing effects whatever. Keep in mind a correct picture of the conditions, viz: two pieces of similar comparatively soft material (glass) with Carborundum grains free between them.

We are to find that polishing is an entirely different kind of operation. Dr. Elihu Thompson, in the book above referred to says of it:

"In grinding, the surface is crushed, while in polishing it is clean cut. Smooth cutting is the rule. The polishing is indeed a kind of planing process; the particles of rouge set themselves into the pitch surface and cut smoothly; they do not roll or grind. There are millions of fine planing or cutting edges at work fixed in position by becoming, at least temporarily, embedded in the pitch surface, which readiy yields to receive them."

It should be explained here that the telescope maker, after grinding his mirror to approximately correct curvature, prepares a lap of pitch by melting the pitch and pressing his mirror down against it, giving it the shape of the mirror. He then coats the pitch lap with rouge and proceeds to polish the mirror by rubbing it against the rouge covered pitch lap.

In comparing our work of gem cutting and polishing with the above descriptions we will find some parallels and some apparent discrepancies. Our conditions are somewhat different throughout. We must make allowance for this and try to arrive at correct conclusions as to what happens in each of our operations.

Our grinding against a Carborundum wheel certainly is not entirely the first or crushing operation. It is partially a planing operation. All abrasive grains are fixed at the beginning of the operation, but it is to be noted that the grains break loose quite rapidly from the wheel and must roll between the wheel and the stone till they are thrown away from the wheel by centrifugal force. So does not this grinding partake to a considerable extent of the crushing process? How else explain the fact that a soft wheel is required and the surface at the end of a grinding operation is pitted instead of scored? It is quite noticeable that at the end of any grinding operation on Carborundum wheels there are few scores visible.

Some of our operations will probably be against a metal lap with Carborundum paste daubed on it. What happens here? Is this not entirely the rolling and fracturing process? The writer used to think this was planing caused by Carborundum grains partially embedded in the metal, but was puzzled by the fact that the metal lap could be rinsed in water and be perfectly smooth, showing no embedded grains. It is very noticeable here too that in general no scores are visible.

Some times when grinding with fine Carborundum scoring will suddenly show up. The scraping may be felt and the surface of the stone will become covered with scratches, making it necessary to carry the stone back through a faster cutting operation to free it from these scratches. They look like clean plowed furrows. They are apparently caused by a coarse grain of Carborundum getting into the mix. Are these scratches scores or rolled fractured paths? Why does this coarse grain seem to cut a furrow while the normal grains seem to roll and fracture the stone? These apparently smooth furrows may consist of a series of pits as fractured by a rolling grain, the writer has never exam-

ined them under a glass powerful enough to show this. One coarse grain would naturally fracture deeper than the fine grains, because all the pressure on the stone would be against the one outstanding grain, while with many grains of uniform size the pressure is distributed against them all.

Somewhere in our work we will quite likely use a wood lap with Carborundum paste. Some scoring will show up in this operation, especially when using the "internal grinder" of wood, but sometimes when working against the side of a flat lap. While a casual rinsing will clean a flat lap of Carborundum grains, does not the scoring show that grains become embedded, probably temporarily, in the wood and act as planes? Is this entirely a planing operation or is it partially a "rolling and fracturing"?

The final cutting and the real polishing will be done on a cloth or felt wheel with pumice stone and then tin oxide or possibly with fine Carborundum and then tin oxide. What is the process? Dr. Thomson has said (as quoted above) that this is purely a planing process, but Dr. Thomson's abrasive was embedded in a pitch lap which held each particle of rouge as a miniature cutter. Our abrasive is loose on the surface of a felt lap. Or is it loose? Does the felt or cloth lap hold our microscopic knives of tin oxide so firmly that they can plane away the surface to the degree of smoothness that we want? The study of all these operations, differing in kind, is an interesting field of thought and one that may well occupy the mind of "The Amateur Lapidary" as he struggles to bring a polish to some especially obdurate stone, and it is sincerely hoped that he will write us of his findings and concusions and his reasons for them.

A PEEK AT OUR MAIL

Got His Money's Worth!

Madison, Wisc.—I have been a member of the Association for the past three months, and although I make part of my living as a fiction writer, I fail to find words expressive enough to describe the satisfaction I receive from each issue of the magazine. For once I really got more for my money than I had expected.—Richard G. Huzarski.

Fluorescent Numbers Please!

Milwaukee, Wisc.—I always look forward to the publication of ROCKS and MINERALS, and your last two issues (April and May) have been especially inspiring.—Geo. B. Goodwin.

Never Grows Old!

Bloomington, Ill.—ROCKS and MINERALS is the official magazine of our geology club at Bloomington High School, and we do not want to miss any copies of it. We save them all and they are just as GOOD when a year old as they are when new.—Harry L. Adams.

A Splendid Magazine!

Houston, Texas.—Find enclosed money order in the amount of $1.50 as payment for another year's renewal. I think ROCKS and MINERALS is a splendid magazine.—E. S. Butler.

WHO'S NEXT?

Peter Zodac, Secretary,
Rocks and Minerals Association:

Please enter my order for 10 copies of the Tenth Anniversary Number for which I am enclosing check in the amount of $10. You may use the balance for helping to defray the cost of colored illustrations. I am looking forward to ROCKS and MINERALS' finest number and trust that all members will co-operate so that the Tenth Anniversary Number will be a grand success.—R. Emmet Doherty, President Rocks and Minerals Association.

A Key to Precious Stones

L. J. Spencer, C.B.E., M.A., Sc.D., F.R.S., F.G.S., F.C.S., F.R.G.S.

Editor of the Mineralogical Magazine, (England); formerly Keeper of Minerals in the British Museum; Honorary Life Fellow of the Mineralogical Society of America; Honorary Member of the German Mineralogical Society.

Blackie & Sons, Ltd., publishers, London & Glasgow, 1936. Price 5s ($1.25).

Reviewed by H. ALBAN ANDERSON.

The above book has just come from the press of Blackie & Son, Ltd., London and Glasgow. Its author, Dr. L. J. Spencer—internationally eminent as a mineralogist and gem expert, the holder of several University degrees, Fellow of distinguished Scientific Societies abroad and in America, writer of the article on "Chrystallography" in the 11th edition of the Encyclopedia Britannica—will be more intimately known by the readers of this magazine as a member of The Rocks and Minerals Association and one of its former Vice-Presidents.

No one could be better qualified for so difficult a task as that of preparing "A Key to Precious Stones," as one of the long and wide experience it has been Dr. Spencer's good fortune to enjoy. A lover and student of gem stones, he would, by his book, awaken in all of us a greater appreciation of these rare and magnificent flowers of the mineral kingdom. In his Introduction, the Doctor writes: "The casual admirer of gems, whose horizon is limited to diamond, ruby, sapphire, emerald and opal, really sees no more in them than in bits of tinsel and colored glass, and is only impressed when told they are rare and costly." Having thus placed most of us where we belong, he continues: "If precious stones attracted attention only on account of their gaudiness and costliness, then there would be little more to say about them beyond the merely obvious. They possess, however, a number of remarkable properties which can only be appreciated and understood when they are studied more closely."

A little further he warns us: "Since precious stones are minerals, they must be seriously studied as minerals. They are not merely pretty things to look at. Some acquaintance with the general principles of mineralogy is, therefore, necessary for their proper appreciation." Accordingly one-half of this 237 page book is devoted to a "popular and elementary exposition," of such general mineralogical principles as apply to precious stones. But it is by no means dull. Such physical properties as color, lustre and brilliancy are more interesting than text book discussions of them, when Dr. Spencer presents them as "the features that attract attention to gem stones." So with Chapters on Density and Hardness, Forms of Crystals, Chemical Composition and Optical Characters. In none of these does Dr. Spencer allow his subject to break away from him and plunge into a troubled sea of technicalities. If the reader desires to do so, he is referred to textbooks where he can dive in as deeply as he likes. Only once does the author waver a bit, and that in the chapter on optics, perhaps the most difficult to discuss in any style of language or form of presentation. After commenting interestingly upon the behaviorism of a ray of light entering a cut stone, one suspects a sigh as he continues: "Now after all this dose of optics, we come to the really important point. That is the methods for the determination of the refractive index, or the velocity of light, in gem stones."

Other chapters on Geological Occurrences, Mining of Precious Stones, Cutting and Polishing, Nomenclature of Gems, Imitation Gems and Artificial Gems, will prove not only entertaining but very informative reading.

Dr. Spencer then raises the curtain and displays his exhibit. He does not limit it to the precious stones, but describes many of the semi-precious, some of which are not so well known to the public and to the trade as is warranted by their beauty and, occasionally, their rarity. At the end of each is printed the key, that summarization of physical and optical characteristics as make their identification positive.

A perusal of the book should lead to greater interest in all gem stones. A little closer application should arouse the appreciation of them for which Dr. Spencer hopes.

The book is recommended to the readers of this magazine as one to be read and kept conveniently near on the mineralogical shelf of the library.

Rocks and Minerals Association Fourth National Outing

The 4th National Outing of the Rocks and Minerals Association held Sunday, May 24, 1936, was not only a grand success but unique in that for the first time individual outings were inaugurated; group outings being held in but three states. A large number of members and their friends in practically every state in the Union trekked to mineral localities within their respective states and many fine specimens were collected. Reports on the group outings are as follows:

MARYLAND, (Held June 5th)

Directors—A. LLewellyn Jones and Walter E. Price, Jr.

A group of 15 assembled at the corner of Bolton Street and North Avenue, in Baltimore at 10 A. M: Although rain was encountered later in the day, the trip was unusually successful. The following localities were visited and many minerals found chief among which are the ones mentioned:

Baltimore City—At the 29th Street Bridge excavation. In pegmatite: biotite, muscovite xls, apatite, pyrite xls, and sphero-siderite.

Milford Trap Quarry, Baltimore Co.—In gabbro: laumontite xls, stilbite, zoisite, chlorite xls, pyrrhotite, and ilmenite.

Dyer Quarry, Delight, Baltimore Co.—In serpentine: picrolite, baltimorite, deweylite, garnierite, opal, magnesite, chalcedony, and stibnite.

Owings Mills, Baltimore, Co.—In mica schist: garnets and cyanite.

Old Mineral Hill Copper Mine, Carroll Co.—Chalcopyrite, octahedral pyrite xls, epidote, talc, actinolite, magnetite, and speccular hematite.

The laumontite at the Milford Quarry was collected as cabinet specimens. At practically all localities, minerals were found that heretofore were unreported from them. Some in our group experienced their first mineral collecting and expressed their delight with the subject of mineralogy. We are happy to say that we have gained several converts to our ranks.

MASSACHUSETTS

Director—John Kitson.

Assistant Directors—Prof. Benjamin Shaub, Anthony Kendrew, Raymond Schortman, Alvin Schortman, Walter Connor.

The third outing of the Massachusetts division of the Rocks and Minerals Association, held at the emery mines, Chester, Mass., on May 24, 1936, was an unqualified success. Under a fair sky and a warm sun tempered by refreshing breezes, more than 150 members and their friends enjoyed a program of rocks and minerals lore which was carried through as scheduled. Promptly at 1:30 P. M., the director welcomed the visitors and introduced Prof. B. N. Shaub of Smith College as the speaker of the day. In his talk, Prof. Shaub outlined very clearly the composition of the local ore and then discussed the chemical and physical properties of the minerals associated with the local ore, particularly those that are fairly common in the mine dumps that the party visited at the conclusion of the instructive and very interesting talk.

After a period of collecting, the group reassembled at 3:30 and a calvacade of 36 cars, escorted by local traffic officers and headed by the Chairman of the Chester Board of Selectmen, proceeded to the plant of the Hamilton Emery and Corundum Co., where Mr. S. J. Donnelly, office manager, extended the privilege of collecting from the Company's ore piles of Turkish and Greek emery, and then very ably described the manufacture of emery abrasives as he conducted the visitors through the mill. From the mill, the group journeyed to the Public Library where a very excellent collection of local and other minerals were viewed with much delight. Officially the group gradually dispersed, but unofficially many of the party visited the home of Mr. Donnelly and were rewarded with the opportunity to collect any number of North Carolina corundum crystals and massive corundum from Georgia. Some also visited the home of Mr. G. Laurent who donated many fine cabinet specimens of minerals from his collection.

The director and his assistants are very glad to report such a splendid outing—educational, recreational, and inspirational.

NEW YORK—NEW JERSEY

Directors—Peter Zodac (A.M.) and James F. Morton (P. M.)

This outing was limited strictly to members and a total of 81 were present. The morning activities were centered at the world famous New Street Trap-Rock quarry, Paterson, N. J., where many fine specimens of prehnite, pectolite, thaumasite, amethyst and other varieties were collected.

In the afternoon, the group, directed by Mr. Morton, journeyed to the Braen's Trap Rock quarry, Hawthorne, N. J. The following account was prepared by Mr. Morton:

Braen's quarry proved to be extremely interesting; and I think that all were well pleased. There was not a great variety of minerals but there were fine examples of the types that were there and in considerable quantity. The rounded stilbite and pink heulandite characteristic of this quarry and not found anywhere else were present in goodly amount and delighted everybody. Less abundant were some attractive chalcedony and agate which were highly prized by the lucky finders. In similar vugs to the striking and beautiful heulandite were equally charming little groups of small or drusy quartz and calcite crystals. Prehnite was scarce but two or three unusual and very handsome specimens were found.

It was a hot day and after everybody was loaded down with specimens, those not required to hurry away came to the Paterson Museum where we had a good time looking things over. Both the fluorescent exhibit and the general mineral collection received many kind and applausive words.

Past, Present and Future

By R. EMMET DOHERTY

President Rocks and Minerals Association

Upon becoming the new president of the Rocks and Minerals Association, I find myself scanning the situation with an X-ray eye. First, what is the most important feature of the Association? The publication, ROCKS and MINERALS Magazine naturally.

What has been the past performance of the magazine? Upon looking over some of the back numbers I find a very interesting sentence or two in the nature of a prophesy. On page 26, Vol. 1, No. 2, Deember, 1926, under the heading, "The Sluice Box," is the following comment, "Signs point to a revival of Mineral Collecting in this country. Loyal support of ROCKS and MINERALS will be one great factor in bringing this about." Written ten years ago, it was as though the writer had peered through the fog of the future and seen the clear outline of this discriminating diversion as it is today.

From the humble start of this mineralogical magazine in 1926, the first in 18 years, it has grown to be the greatest publication of its kind in the world, with subscribers in every state of the Union and in almost every country on earth. Beginning with a few scattered interested collectors, the magazine has encouraged thousands to become actively engaged in this intellectual pursuit. From a few professional lapidaries, there are now hundreds of amateurs doing fine work in the gem field. The idea has so spread, that from one mineral magazine, there are now many, creating competition. This in itself, proves the worth of the study, and acts as a spur and encouragement to the first in its field, namely, ROCKS and MINERALS

It is fitting to say that the past has been an up-hill climb, marching with Father Time in his never relenting pace, but at present both the Magazine and the Assocciation enjoy enviable positions: both pioneers and both the largest in existence.

Once a man becomes interested in mineralogy, it is sure to cling to him for the rest of his life. No matter what age is reached, it is always a pleasure to open one's cabinet and commune with the old friends therein, remembering the experience of obtaining this specimen and the friends made while acquiring that gem or crystal. How can we create a more pleasant future for this interesting study?

1—Support our journal ROCKS and MINERALS.

2—Be an active member; it takes little effort. Boost the Association and its purposes.

3—Collect, exchange or purchase new specimens in order to keep our collections alive. See that the display is properly lighted.

4—Invite others to seee our collections and try to interest them that they too may enjoy the study and become members of the Association.

5—If we sell or exchange be sure we are discriminating.

Many lucky individuals can do more to help financiallly than in any other way. The coming September number is the Tenth Anniversary number. If we all get together, instead of a 24 page issue we can make it 84 pages, possibly with colored illustrations. The cost of this issue would be well over $500.00. If every member sends the secretary at least 25c. this number can be put across. For those who feel they can afford more, we might suggest this entire issue be endowed in their names.

At any rate if these suggestions are taken seriously and carried out, the coming ten years will show a vast change for both the Association and the Magazine. Paste this in the scrapbook of your memory and ten years from now drop me a line to tell me I was right.